HV:L89F, HV:T108R, and HV:K141Q or conservative substitutions thereof (i.e., HV:L89W, HV:L89Y, HV:T108H, HV:T108K, HV:K141N).

[0013] In some embodiments, the light chain amino acid sequence is at least 75% identical to the light chain variable region of SEQ ID NO.: 3 and includes a LmdV:Y2P substitution or a conservative substitution of proline at LmdV:Y2.

[0014] In some embodiments, the heavy chain amino acid sequence is at least 75% identical to to the heavy chain variable region of SEQ ID NO.: 63 and includes an HV:V79T substitution or a conservative substitution of threonine at HV:V79.

[0015] In some embodiments, the heavy chain amino acid sequence is at least 75% identical to to the heavy chain variable region of SEQ ID NO.: 64 and includes an HV:R82V substitution or a conservative substitution of valine at HV:R82.

[0016] In some embodiments, the heavy chain amino acid sequence is at least 75% identical to to the heavy chain variable region of SEQ ID NO.: 65 and includes an HV:L89F substitution or a conservative substitution of phenylalanine of HV:L89.

[0017] In some embodiments, the heavy chain amino acid sequence is at least 75% identical to to the heavy chain variable region of SEQ ID NO.: 66 and includes an HV:T108R substitution or a conservative substitution of arginine at HV:T108.

[0018] In some embodiments, the light chain amino acid sequence is at least 75% identical to the light chain variable region of SEQ ID NO.: 22 and includes a LmdV:Y2P substitution or a conservative substitution of proline at LmdV:Y2, and the heavy chain amino acid sequence is at least 75% identical to the heavy chain variable region of SEQ ID NO.: 69 and includes an HV:R82V substitution or a conservative substitution of valine at HV:R82, and an HV:T108R substitution or a conservative substitution of arginine at HV:T108.

[0019] In some embodiments, the heavy chain amino acid sequence is at least 75% identical to the heavy chain variable region of SEQ ID NO.: 70 and includes an HV:V79T substitution or a conservative substitutions of threonine at HV:V79, an HV:L89F substitution or a conservative substitution of phenylalanine at HV:L89, and an HV:T108R substitution or a conservative substitution of arginine at HV:T108.

[0020] In some embodiments, the light chain amino acid sequence is at least 75% identical to the light chain variable region of SEQ ID NO.: 24 and comprises a LmdV:Y2P substitution or a conservative substitution of proline at LmdV:Y2, and the heavy chain amino acid sequence is at least 75% identical to the heavy chain variable region of SEQ ID NO.: 71 and includes an HV:V79T substitution or a conservative substitution of threonine at HV:V79, an HV:L89F substitution or a conservative substitution of phenylalanine at HV:L89, and an HV:T108R substitution or a conservative substitution of arginine at HV:T108.

[0021] In some embodiments, the isolated anti-HIV antibody, or antigen-binding portion thereof includes SEQ NO.: 3. In some embodiments, the isolated anti-HIV antibody, or antigen-binding portion thereof includes SEQ NO.: 63, 64, 65, 66, or 70. In some embodiments, the light chain variable region includes the light chain variable region of SEQ NO.: 22 and the heavy chain variable region includes the heavy chain variable region of SEQ No.: 69. In some embodiments, the light chain variable region includes the light chain variable region of SEQ NO.: 24 and the heavy chain variable region includes the heavy chain variable region of SEQ No.: 71.

[0022] In another aspect, the present disclosure also provides a pharmaceutical composition having the above-presented anti-HIV antibody or antigen-binding portion and a pharmaceutically acceptable carrier or excipient. In some embodiments, the pharmaceutical composition further includes a second therapeutic agent. In some embodiments, the second therapeutic agent is an anti-HIV-1 broadly neutralizing antibody, such as 3BNC117.

[0023] In another aspect, the present disclosure additionally provides a nucleic acid, or a codon-optimized nucleic acid, encoding the above-presented anti-HIV antibody or antigen-binding portion thereof. Also provided is a vector or vector system having at least one above-presented nucleic acid and a cell having at least one above-presented nucleic acid.

[0024] In another aspect, the present disclosure provides a method of making recombinant anti-HIV antibody, or antigen-binding portion thereof. The method includes, among others, obtaining the cultured cell mentioned above, culturing the cell in a medium under conditions permitting expression of a polypeptide encoded by the vector and assembling of an antibody or fragment thereof, and purifying the antibody or fragment from the cultured cell or the medium of the cell.

[0025] In another aspect, the present disclosure provides a method of preventing or treating an HIV infection or an HIV-related disease. The method includes, among others, identifying a patient in need of such prevention or treatment, and administering to said patient a first therapeutic agent having a therapeutically effective amount of at least one above presented anti-HIV antibody of or an antigen-binding portion thereof. The method can further include administering a second therapeutic agent. The second therapeutic agent can be administered before, concurrently with or after the administration of the anti-HIV antibody or antigen-binding portion thereof. In some embodiments, the second therapeutic agent is an anti-HIV-1 broadly neutralizing antibody, such as 3BNC117.

[0026] In another aspect, the present disclosure further provides a kit having a pharmaceutically acceptable dose unit of a pharmaceutically effective amount of at least one isolated anti-HIV antibody presented above or antigen-binding portion thereof. The kit can further include a pharmaceutically acceptable dose unit of a pharmaceutically effective amount of an anti-HIV agent. The two pharmaceutically acceptable dose units can optionally take the form of a single pharmaceutically acceptable dose unit. An exemplary anti-HIV agent can be selected from the group consisting of a non-nucleoside reverse transcriptase inhibitor, a protease inhibitor, an entry or fusion inhibitor, and an integrase inhibitor. In some embodiments, the anti-HIV agent is an anti-HIV broadly neutralizing antibody, such as 3BNC117.

[0027] The foregoing summary is not intended to define every aspect of the disclosure, and additional aspects are described in other sections, such as the following detailed description. The entire document is intended to be related as a unified disclosure, and it should be understood that all combinations of features described herein are contemplated,